



Communication Plan

WP5 – Cooperation with stakeholders

June 2016

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Executive summary

“Cooperation with Stakeholders” is a key element aiming at coordinating European Geothermal RDD&I (Work Package (WP) 5 of the Geothermal ERA-NET).

The overall goal of the present Communication plan is to engage principal stakeholders for the coordination of geothermal RDD&I in a European research agenda from the viewpoint of program owners and program managers.

Building on the accomplishments of the Geothermal ERA-NET, the communication strategy intends to reach the defined goals by communicating the strengths and benefits of a coordinated European geothermal energy research agenda to the target audiences. Since the Geothermal ERA-NET participants' primary functions are those of governmental entities, the ERA-NET offers a unique opportunity to engage, with high priority and in a concerted manner, principal stakeholders throughout Europe and across the geothermal energy value chain ranging from grant-receiving members of the research community to industry actors that develop and deploy geothermal technologies. As funding agencies and governmental administration, the ERA-NET participants can be one of the lead drivers towards European cooperation.

The stakeholders have been characterized in terms of their importance and influence on the strategic direction and the coordination of geothermal RDD&I.

The main target audiences of the Communication plan are therefore:

1. Political stakeholders of the EU; especially the EU Commission and the Directorate-General (DG) for Energy
2. Partners of the Geothermal ERA-NET (National program owners / funding agencies)
3. Program owners / Funding agencies of Non-ERA-NET EU countries and non-European countries with significant geothermal RDD&I programs
4. National members of the SET-Plan Steering Group
5. European Geothermal Industry Associations (EGEC, GEOELEC-Platform, Geothermal Technology Panel of the RHC-Platform)
6. EERA – JPGE Joint Programme on Geothermal Energy

The principal stakeholders need to be convinced that cooperation and a mutual opening up of research programs is highly beneficial, enabling higher productivity and optimal use of national resources to promote the uptake of geothermal energy. It is elementary to provide consistent messages on the benefits of European collaboration via the ERA-NET instrument. 12 Key messages have been developed to achieve the goals of the communication plan. They demonstrate in simple language phrases the value, benefits and strength of concerted transnational research and innovation. The messages provided will lead decision makers to favour European cooperation by way of demonstrating the added value from such

cooperation. The Geothermal ERA-NET has already developed some joint activities that exemplify the way key messages are being lived.

In a next step (report D5.4), the Geothermal ERA-NET will prepare a comprehensive action plan to successfully engage stakeholders in the run-up to the development of a strategic roadmap for geothermal energy RDD&I in Europe.

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Introduction

1.1 Purpose of the document

The purpose of the document is to inform the reader how participants of the ERA-NET intend to communicate the benefits of a closely knit transnational European framework of program owners and managers who support geothermal research, development, deployment and innovation (RDD&I) activities. Historically this has taken place mostly on a national basis, but the time has come to expand the horizon and pursue the support on a European and, where appropriate, on an even broader international scale. The key recipients are those governmental entities, mostly legislative and executive, that allocate budgets to program owners and the immediate beneficiaries of support measures, mostly academia and industry who engage in RDD&I activities.

1.2 Background

Research, development, deployment and innovation (RDD&I) is an essential element in the sustainable development of industrialized countries: the competitiveness of companies and the employment they can provide depend to a great extent on RDD&I; and RDD&I is also essential for the support of other policies such as consumer and environmental protection. In short: the individual and collective wellbeing of citizens depends on the quality and relevance of RDD&I. Europe's energy sector is subject to powerful trends; one of them is a deep consensus to develop an increasingly sustainable and secure supply of energy. Similarly, countries are in the process of setting ever more ambitious goals to limit the adverse impact of climate change on people, the environment and the economy. In response, European countries have for example established national renewable energy action plans (e.g. NREAP, national energy strategies and implementation plans) which frequently feature geothermal energy for the supply of heat and power owing to its many benefits.

In regions with high quality resources and proven reserves, geothermal energy is cost-competitive and a significant contributor a country's energy supply (e.g. geothermal power in Iceland, Italy, Turkey; geothermal heat in countries such as France, Sweden, Germany, Switzerland to name but a few). Hence geothermal energy does not enjoy significant national interventions in the form of subsidies. There are, however, a number of technical, economical, commercial, organizational and socio-political challenges and risks related to the utilization of other than the best and optimal geothermal resources. These resources must be tapped if Europe's goals for energy and climate change are to be achieved.

Overcoming those challenges to fully unleash the geothermal energy potential is a target that many national governments have set themselves, and hence also many actors and stakeholders at a national and a transnational level (e.g. industry associations, academia, and parliaments). Research, development, deployment and innovation plays a key role in overcoming the challenges; by the very nature of the European Union, Member States, associated and third countries can pursue the goals via concerted RDD&I actions, because, especially in the geothermal sector, there are a number of trends emerging within the geothermal innovation system:

- Research is increasingly complex and interdisciplinary;
- Research is increasingly costly;
- Research requests a constantly increasing "critical mass".

At a national level, hardly any research team, research laboratory or company can reasonably claim to be able to respond to these challenges. Even the largest and most affluent European countries find it increasingly difficult to be active and play a leading role in the many important areas of scientific and technological advance.

Organizing co-operation at different levels, coordinating national or European policies, networking teams and increasing the mobility of individuals and ideas is therefore a requirement resulting from the development of modern research in a global environment. Without concerted actions at a European level, the present fragmentation of Europe's efforts cannot be overcome.

Key efforts are being made and are well under way in terms of RDD&I strategies and implementation plans. Most national governments with an active interest in geothermal energy have research strategies and associated implementation plans along with a plethora of similar strategies and plans. Some industry associations, national public research centers and universities are even organized at the European level in important research structures such as the European Energy Research Alliance EERA – Joint Program on Geothermal Energy JPGE).

There is a continuous evolution towards «big science» in various national innovation systems. The European Commission (EC) has played a key and decisive role in promoting and supporting major research, pilot and demonstration projects related to geothermal energy through a range of instruments (funded via research framework programs, the most recent of which is Horizon2020, and via sales of emission allowances (the New Entrants' Reserve NER within the European Emissions Trading System). It thus becomes increasingly clear that national geothermal program owners and managers of geothermal energy RDD&I programs have to step up their coordination efforts and develop in tandem with the European Commission a well-coordinated and integrated strategy and implementation towards unlocking the geothermal resource potential.

According to the statistics of the International Energy Agency (IEA) on research and innovation investments European countries (reporting to the database) have increased their RD&D budgets significantly since the year 2000 (Table 1), albeit from relatively moderate or low levels of around € 10-20 million annually to about double that. In terms of total government interventions (R&D investment, investment support, support to production, support to energy savings and support to energy demand), support for geothermal has been miniscule at around €2012 70 million when compared to other primary sources of energy (Table 2).

The reasons for this languishing obscurity are not clear, but the following may offer part of an explanation; while prime resources are cost-competitive and do not need high levels of government inventions, the much more ubiquitous lower quality resources, whilst holding the vast amount of resources and reserves, are a factor of 2-10 less cost-competitive in terms of levelized cost of electricity or heat. Other factors may include the lack of appreciation of the potential impact of technological innovation, general low visibility of geothermal energy as a viable option in the energy mix, a historic lack of strong lobbies and associations, or a less endearing image compared to photovoltaics or wind energy.

A coordinated effort of program owners and managers will thus not only raise the level of awareness of the requisite levels of R&D investments for a more wide-spread uptake of geothermal energy, but will also maximize the value derived from combining and leveraging existing financial resources and by allocating those resources to those partners who are best qualified to execute research and innovation that will drive down cost, improve environmental performance and have the least adverse

impact on people. The scope of such collaboration and leverage is large as exemplified by the joint programming of the EERA-JPGE or the research agendas proposed the EGEC, for example

Table 1 Investment in geothermal RD&D including near-surface geothermal energy.

Values are in millions of €₂₀₁₃. Iceland and Slovenia (two Geothermal ERANET countries do not report data to the IEA). Data are patchy, but trends are clear; investments have increased in recent years particularly in Germany and Switzerland.

COUNTRY	YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Austria		0.0	0.1	0.2	0.0	0.3	0.1	0.0	0.0	0.9	0.4	0.6	0.1	1.1
Belgium		..	..	..	..	..	..	..	0.6	..	..	..	0.6	0.7
Czech Republic		..	..	..	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.0	..	..
Denmark		0.0	0.0	0.0	0.0	0.0	..	0.0	0.0	0.0	2.3	0.0	0.0	0.0
Estonia		..	..	..	..	..	..	..	..	..	..	..	0.0	..
Finland		0.0	..	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..	0.0	0.0	0.0
France		0.9	4.7	4.2	6.4	5.8	6.8	3.0	4.1	4.0	7.5	4.5	4.7	4.8
Germany		2.7	8.3	11.3	12.8	6.5	11.8	15.4	15.9	8.0	14.7	10.4	18.7	21.3
Greece		..	..	..	..	..	..	..	0.0	0.0	0.0	..	..	..
Hungary		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iceland	Not captured in IEA database													
Ireland		..	..	0.0	0.0	0.2	0.1	0.3	0.1	1.3	0.4	0.4	0.0	0.0
Italy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.1	5.2	8.3	..
Luxembourg		..	..	..	..	..	..	..	..	..	..	..	0.0	0.0
Netherlands		0.0	0.0	3.6	0.0	..	0.0	0.0	..	..	0.1	1.0	0.9	0.2
Norway		0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	..	..	..	0.4
Poland		..	..	..	..	..	..	..	..	..	0.0	0.1	0.1	0.0
Portugal		0.1	0.0	0.0	0.0	..	..	0.0	0.0	0.0	0.0	..	0.0	0.0
Slovak Republic		..	..	..	0.0	0.0	..	..	..	0.4	0.5	0.5	0.0	0.0
Slovenia	Not captured in IEA database													
Spain		0.0	0.0	..	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..	11.4	0.6
Sweden		0.4	0.6	4.8	1.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Switzerland		2.2	2.8	1.5	2.4	1.8	1.5	1.9	1.0	2.9	5.8	5.4	4.6	4.6
Turkey		0.7	0.4	0.7	0.4	0.1	0.0	0.5	0.1	0.2	0.2	..	..	..
United Kingdom		0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.5	..	5.2	1.4	0.0	0.1
SUM		7.1	16.8	26.2	23.6	14.9	20.3	21.2	23.3	18.4	40.0	29.5	49.3	33.9

Table 2 Support per technology and year, including the free allocation of GHG credits (in million €₂₀₁₂).
Source: Ecofys (2014) Subsidies and costs of EU Energy Final Report]. The reasons for the very low support for geothermal are not clear.

Technologies	2012 (M€ 2012)
RE – Solar	14,700
RE – Wind	11,190
o.w. offshore	1,360
o.w. onshore	9,830
RE - Biomass	8,310
RE - Hydro	5,020
RE – Geothermal	70
RE – Other	1,030
RE – Total	40,320
FF – Coal	9,740
FF – Natural gas	6,550
FF – Oil products	0*
FF – Other	40
FF - Total	16,330
Heat pumps	0*
Nuclear	6,560
Infrastructure	200
Support to energy demand	27,360
Support to energy savings	8,590
Total	99,360
Not specified	60
Grand Total	99,420
Free allocation of EUAs	13,700
Direct historic support	9,000

Notes: 0* indicates that there is a value but it is below the level of rounding.

1.3 Geothermal ERA-Net b

The Geothermal ERA-NET is a cooperation instrument supported by the European Commission. The Geothermal ERA-NET focuses on the utilization of geothermal energy that involve direct heating and power generation. It is a four-year project (2013-2016) led by Iceland and comprises partners from France, Germany, Hungary, Iceland, Italy, the Netherlands, Slovakia, Portugal, Switzerland, and Turkey.

The overall objective is to deepen European cooperation on geothermal research at national and administrative levels and enable the integration of national research programs. This is achieved by the mutual opening up of national research programs and in future, its research infrastructures, and the development of joint activities.

To assure optimum benefits of the network generated by this ERA-NET, the network's management is supported by a governance structure involving:

- A Geothermal ERA-NET consortium where all partners are national program owners or managers and have assigned senior staff to this project with knowledge of the sector and international experience to manage the Geothermal ERA-NET;
- A High Level Policy and Implementation Committee that supports the Geothermal ERA-NET, encompassing program owners (i.e. ministries of member and associated states). The committee is mandated to take policy decisions needed to be implemented at national level.). It also ensures that the scope of Geothermal ERANET remains adequate and strengthens the commitment of the program owners and Member States involved to this ERA-NET

1.4 Work Package 5 “Cooperation with Stakeholders”

The objectives of the work package 5 have been defined in the terms of reference as follows:

- 1) To gain a clear understanding of the principal stakeholders including key industry players for a successful, Europe-wide coordination of publicly funded, national research, development, deployment and innovation programs.
- 2) To engage and communicate with principal international stakeholders the need for, values and benefits of a Europe-wide coordination.
- 3) To communicate and compliment the ongoing work of platforms in geothermal energy e.g. ETP-RHC, TP-GEOELEC, EERA JPGE and others.
- 4) To prepare the ground for the future formulation of a common European roadmap for geothermal energy technology research, development, deployment and innovation program.

The detailed scope of work comprises four tasks:

Task 5.1: Collection of data and classification of stakeholders

Contribute data to WP2 and the European Geothermal Platform (WP3) on principal stakeholders of the Research, Development, Deployment and Innovation (RDD&I) chain in national, regional and European arenas with a particular focus on stakeholders with a European and international dimension. This task will be closely coordinated with the activities of WP 2. Develop stakeholder classification and ranking according to their roles and responsibilities in strategy setting, implementation planning and execution. Performance evaluation and review of networked, transnational geothermal energy RDD&I programmes (output of WPs 2 and 4).

Task 5.2: Furnish national program owners

Furnish national programme/owners with messages on and proofs of strengths and benefits of a coordinated European geothermal energy research agenda vis-à-vis the voting public, the energy industry, national parliaments, the European Commission and her administration (output of WP 1).

Task 5.3: Engaging with principal stakeholders

Prepare and utilize output of WPs 2 and 4 to engage with principal stakeholders with the ultimate purpose of mobilizing national and transnational funding agencies (public and private) for the geothermal RDD&I lifecycle.

Task 5.4: Roadmap for geothermal energy technology

Prepare and utilize output of WP7 to engage with principal stakeholders in the run-up to the development of a strategic roadmap for geothermal energy technology RDD&I. The Task activities will ensure efficient and structured collaboration with principal stakeholders in order to further reduce the fragmentation of transnational research activities and policies and to maximize synergies. Existing technology platforms will be mobilized. Support and encourage large scale projects which would not be possible at national level.

2 Goal of the Communication Plan

The overall goal of the Communication plan is to engage principal stakeholders for the coordination of geothermal RDD&I in a European research agenda from the viewpoint of program owners and program managers. Their principal stakeholders need to be convinced that cooperation and a mutual opening up of research programs is highly beneficial enabling higher productivity and optimal use of national resources to promote the uptake of geothermal energy. Invariably, this process will lead to a partial allocation of human and financial resources to a European forum (e.g. ERA-NET) which in turn will share responsibility with national program owners and managers and relevant Directorates-General and Services of the European Commission, and be also accountable for successful delivery of transnational program goals.

2.1 Goals on national level

The goal of the communication plan on the national level is to provide consistent messages on the benefits of European collaboration via the ERANET instrument. Recipients of the messages are the immediate program owners and managers, their funding entities (generally, the Ministries and Parliaments) and the direct beneficiaries of the funding agencies.

- Mutual opening up of national research programs and research infrastructures, and the development of joint activities.
- Enable the sharing of national resources within the ERANET (or subsequent incarnations of this forum of national program owners and managers).

2.2 Goals on European level

The goals of the communication plan on the European level are to provide messages that will lead decision makers to favor European cooperation via ERANETs by way of demonstrating the added value from such cooperation:

- Minimization and avoidance of fragmentation of European funding programs.
- Facilitation of synergies at regional and pan-European level by mobilizing competitive and non-competitive funds for research in a more coordinated way through joint activities.

Achieving a critical mass to address cross-thematic research targets, thus enhancing cooperation and avoiding fragmentation

3 Strategy

Building on the accomplishments of the Geothermal ERA-NET, the communication strategy intends to enable reaching the defined goals by communicating the strengths and benefits of a coordinated European geothermal energy research agenda to the target audiences. Since the Geothermal ERA-NET participants' primary functions are those of governmental entities, the ERA-NET offers a unique opportunity to engage, with high priority and in a concerted manner, principal stakeholders throughout Europe and across the geothermal energy value chain ranging from grant-receiving members of the research community to industry actors that develop and deploy geothermal technologies. As funding agencies and governmental administration, the ERA-NET participants can be one of the lead drivers towards European cooperation.

4 Target Audiences

The target audiences have been identified and characterized (for results refer to the reports “Stakeholder Analysis on a National Level” (WP5-D5.1-2013-11-08) and “Stakeholder Analysis on a European Level” (WP5-D5.2-2015-09)).

The stakeholders have been characterized in terms of their importance and influence on the strategic direction and the coordination of geothermal RDD&I. This characterization is highly challenging because rather than viewing RDD&I as a linear concept (fundamental research leading to applied research, and on to prototyping and demonstration, deployment and uptake in the market place), innovations systems comprise in reality an exceptionally wide range of stakeholders (research institutes, industry, customers, funding agents, governmental institutions) who act within highly interactive processes.

The structure of national innovation system is more akin to the chain-linked model which has been originated by Kline and Rosenberg¹. Innovations do not occur in a segmented and isolated process, but innovation is driven by a complex set of interactions of all stakeholders, and particularly so if innovation is to be market driven. Hence, a lot of value added results from enabling cooperation and the development of learning processes. It is only a natural consequence that innovation systems are thus highly country specific. One set of stakeholders may be important in one national innovation system whereas the same class of stakeholder may be of lesser importance in another country. This characterization is somewhat politically sensitive, but nonetheless crucial in order to arrive at targeted messages for key stakeholders. The stakeholders are crucial for the development and roll-out of the communication plan.

Very high: Those stakeholders have fundamental influence on the strategic direction and coordination of geothermal RDD&I. As key recipients of ERA-NET messages, they have highest priority in the communication plan and are directly targeted. ERA-NET activities are expected to shape and strongly influence their strategic direction and associated work programs.

High: Those stakeholders have influence on the strategic direction and coordination of geothermal RDD&I and correspondingly have high priority in the communication plan. ERA-NET activities are expected to have a bearing but are not fundamental ingredients into their strategies and implementation programs.

¹ Kline, S. und N. Rosenberg (1986): An overview of innovation. In: Landau, R. und N. Rosenberg (Hrsg.): *The Positive Sum Strategy: Harnessing Technology for Economic Growth*. Washington, D.C.: National Academy Press, pp 275-305.

Medium: Those stakeholders have minor or indirect influence on the strategic direction and coordination of geothermal RDD&I and have medium priority in the communication plan. ERANET output is desired to be of value to these stakeholders but not expected to furnish highly relevant input.

Low: Those stakeholders have little or no influence on the strategic direction and coordination of geothermal RDD&I, and consequently they have low priority in the communication plan. It is expected that only interested stakeholders will note and passively retain knowledge of ERANET activities.

4.1 National Stakeholders

There are a number of stakeholder groups at the national level (Table 3). The most important ones for the communication plan are program owners (along with their budget-setting entities) and managers that have a very high importance / influence.

Table 3: National Stakeholders.

Stakeholder	Importance / Influence
Program owners / Public funding agencies	Very high
Private grant giving institutions	Very high to high
Gov't appointed advisory committees	Very high to high
Political stakeholders	High
Academia	Medium
Power Industry	Medium
Industry	Medium
Other governmental units (except program owners and managers)	Low
Public Stakeholders	Low

4.2 European Stakeholders and beyond

On the European level the target audiences of the communication plan are the following principal stakeholders.

The communication plan first targets at the identified stakeholders with very high importance and influence (Table 6).

Table 4: European Stakeholders with very high importance / influence on the strategic direction and coordination of geothermal RDD&I.

Stakeholder group	Stakeholders	Importance / Influence
Political stakeholders EU	Especially <ul style="list-style-type: none"> – EU Commission – DG Energy 	Very high
EU Institutions, Agencies, Programs etc.	<ul style="list-style-type: none"> – SET-Plan Steering Group – Partners of the Geothermal ERA-NET 	Very high
Political stakeholders of Non-ERA-NET European countries and non-European countries with strong geothermal RDD&I programs.	<ul style="list-style-type: none"> – Program owners / Funding agencies of Non-ERA-NET European countries – International Partnership for Geothermal Technology – International Energy Agency – Geothermal Implementing Agreement – Japan – South Korea 	Very high
European Geothermal Industry Associations	<ul style="list-style-type: none"> – EGEN – GEOELEC-Platform – Steering Committee – Geothermal Technology Panel of the RHC-Platform 	Very high
Academia	<ul style="list-style-type: none"> – EERA – Joint Program on Geothermal Energy 	Very high

Related to the stakeholder group and the made classification, the following stakeholder (groups) are also minor target audiences of the communication plan (Table 8:).

Table 5: European Stakeholders with high importance / influence on the strategic direction and coordination of geothermal RDD&I.

Stakeholder group	Importance / Influence
Political stakeholders EU (All others)	High
EU Institutions, Agencies, Programs etc. (All others)	High to medium

Furthermore, according to the Stakeholder analyses there are several more stakeholder groups which have medium to low importance / influence on the coordination of geothermal RDD&I (Table 6). The communication won't focus on that stakeholder groups.

Table 6: European Stakeholders with medium and low importance / influence on the strategic direction and coordination of geothermal RDD&I.

Stakeholder group	Importance / Influence
Academia (All others)	Medium
Political stakeholders of non-European countries	Medium
Governmentally sponsored think tanks / International Organizations / Multi-lateral R&D treaties	Medium
Industry	Medium
International and national financing agencies with international remit	Low to medium
European or transnational funding programs / platforms	Low
Other EU administrative Units	Low
Public Stakeholders	Low
European Industry Associations	Low
Worldwide Stakeholders (Industry, Academia etc.)	Low

4.3 Main target audiences

The main target audiences of the Communication plan are therefore:

- Political Stakeholders of the EU; especially the EU Commission and the DG Energy
- Partners of the Geothermal ERA-NET (National program owners / funding agencies)

- Program owners / Funding agencies of Non-ERA-NET EU countries and non-European countries with significant geothermal RDD&I programs
- National members of the SET-Plan Steering Group
- European Geothermal Industry Associations (EGEC, GEOELEC-Platform, Steering Committee – Geothermal Technology Panel of the RHC-Platform)
- EERA – JPGE Joint Programme on Geothermal Energy

5 Examples of coordinated actions of program owners and managers at the European level

The Geothermal ERANET (2012-2016) has identified a number of strengths and has developed a number of opportunities that are inherent to a coordinated geothermal research effort. To this effect, in 2015 the ERANET consortium has launched a number coordinated actions (referred to as «Joint Activities» or «JA») to demonstrate the capability to plan and implement, and to demonstrate the value added of a close-knit integration of research program topics and a range of themes related to research management. The purpose is to utilize the Joint Activities as a showcase for efficient communication and to demonstrate that national program owners and managers «walk the talk». Out of the Joint Activities and building on the stakeholder analysis one may derive some simple key messages that are communicated with relative ease and to substantial effect.

5.1 Joint Activity «Tuning EGIP for target users»

The main purpose of the European Geothermal Information Platform «EGIP» within the Geothermal ERA-NET is to share geothermal information in a well-structured manner. To this end an information system at the European scale is under development which will serve as an efficient and comprehensive access point in the form of integrated, combined and harmonized online tools: including geoportals, metadata, official documents and websites. EGIP increases awareness among potential geothermal energy users, international operators and surveyors. Users of the platform have access to electronic information and documents of their interest in the geothermal field including: legal and regulatory aspects, policies, measures, institutions, research projects and any relevant of technical data. Last but not least, the Geothermal ERA-NET expects that EGIP will play an important role in facilitating geothermal energy development in Europe. A first version of EGIP has been piloted since September 2014 driven by a small group of Geothermal ERA-NET countries.

Subsequent to the regional pilot, this Joint Activity (JA) was conceived to provide an in-depth analysis of the boundary conditions for the implementation of the Geothermal Information Platform at the European level, including the evaluation of possible joint calls for a comprehensive realization. The JA builds on the experience gained at the pilot stage to provide focus on the effective needs, impacts and benefits that EGIP should aspire to. Eventually and at a subsequent stage, a comprehensive implementation will be subject of a joint call during a subsequent phase of the Geothermal ERANET, such as a co-fund action.

5.2 Joint Activity «Operational issues of geothermal installations in Europe - OPERA»

The major advantage of geothermal energy in comparison to other renewable energy sources is the time- and site-independent availability of the geothermal resource. To exploit this advantage, the operational availability and reliability of geothermal energy installations have to be high. Scaling and material corrosion for instance, have proven adverse issues with respect to availability and reliability in many geothermal areas in Europe. More specifically these issues arise from boiling point scaling in production wells (calcium carbonate; metal sulfides); from scaling in surface equipment (mostly amorphous silica; calcium carbonate and sulfides to a lesser degree); and from scaling in reinjection wells (amorphous silica). Mitigating the consequences of scaling and corrosion leads to operational down time. Also, issues such as high gas content of the thermal brine or pressure related issues have been reported.

There has been no European platform available which identified the research and innovation needs as identified from operators and field experts. The Geothermal ERANET has thus established a working group on operational issues to provide an overview of potential solutions, like appropriate materials selection in geothermal installation, the use of inhibitors (for example scale inhibitors like phosphonates, polyphosphates and polycarboxylates), optimized pipe geometries and appropriate well designs).

The working group has begun to identify the main issues and bring together experts in this field in the participating countries for a multi-lateral knowledge exchange. The principal aims of the working group have been to; identify the main technical issues regarding the operation of geothermal installations; identify affected plant owners in the participating countries; identify leading experts in this field; select a specific topic for a first collaborative venture; organize a first workshop on a specific topic; publish proceedings of a workshop; nominate experts for a round table discussion and the formulation of best-practice recommendations.

5.3 Joint Activity «NNW – New Ways of Working»

European countries manage the support for geothermal energy through a wide range of programs spanning research and development, support for piloting and demonstration to mechanisms to help geothermal technologies to become a competitive mainstay of the energy industry. The framework for each country differs and aligning technology maturation in such a way that support mechanisms can be invoked in a transnational manner is challenging. Hence, the Geothermal ERA-NET has established a Joint Activity «New Ways of Working», whose goal it is to improve the working practice of national funding institutions and the collaboration with their European counterparts.

The Joint Activity has analyzed national financial instruments that are available and how they operate – and map the operational structure of the different national funding bodies, including policy and funding rules in R&D and industrial projects. The analysis contains the identification of the main barriers and opportunities, and how these instruments can be used in a coordinated fashion. A similar analysis has covered the instruments that are available for supporting the development of geothermal energy projects that deliver heat and/or power.

5.4 Joint Activity «New Concepts»

As geothermal energy development throughout Europe is very heterogeneous, in parts due to the local nature of geothermal resources, the Geothermal ERANET has launched a Joint Activity (JA) «New Concepts». This platform has the goal to stimulate creative new directions/concepts related to geothermal (in utilization and technology) and to showcase successful and innovative (demo/pilot) projects in the geothermal field. For instance, grasping the opportunities of direct utilization of low enthalpy geothermal resources, ranging from innovative solutions in district heating to drying of food and cultivation of algae and fish for production in biotechnology processes.

A key to success of this JA was a showcase or brokerage event where existing (demo/pilot) projects within the field of «New Concepts» were brought together to demonstrate how opportunities can be realized, and thus facilitating cooperation and knowledge exchange. The recently established «Idea Factory» or «World Café» focused on generating new ideas on geothermal utilization (with emphasis on low enthalpy geothermal) to stimulate growth of the geothermal industry in Europe.

Both of these events have been organized as exclusive events where teams have been carefully selected, to achieve the optimal balance of creative and multidisciplinary thinkers as well as people

with experience in innovative direct utilization of geothermal energy and/or a good overview of innovation in geothermal on European level. On the bases of the results the events the Geothermal ERA NET will support further stimulation of new concepts.

5.5 Joint Activity «Reservoir Sustainability – ReSus»

To foster the sustainable and safe use of geothermal reservoirs as well as increase the lifetime of the resource, wells and system components, it is very important to understand the physical properties of the reservoir rocks and fluids and their interaction during the exploitation process. The Joint Activity (JA) «ReSus» was set up as a platform to study geothermal reservoir sustainability taking into account, as a starting point, the tasks which have been addressed in Annex I (Environmental Impacts of Geothermal Energy Development) of the Geothermal Implementing Agreement, a technology cooperation treaty under the auspices of the International Energy Agency (IEA-GIA), and the results of an international workshop on sustainability modelling held in late 2008 in Taupo (NZ).

Comparing the current practice used by the operators, highlighting the best available solutions and studying the unsuccessful cases, a fruitful debate has been initiated to capture the current state-of-the-art and explore possible scenarios for future economic and sustainable exploitations. Beyond the scientific community, the topic of such a JA has generated significant interest from regulatory authorities, and operators who seek to implement sustainable development strategies. Consequently, emphasis was put on involving along with the Geo ERA-NET community, regulatory authorities, the EERA-JPGE as well as the European geothermal operators. A kick-off workshop gathered selected speakers who compiled existing practices used in various geothermal systems.

5.6 Joint Activity «Public Relations for geothermal energy – PR-GEO»

The utilization of geothermal energy evokes an extremely wide range of response from stakeholders ranging from outright opposition to strongest possible support and acceptance. Practitioners and supporters perceive geothermal energy as a key component of Europe's future energy supply in Europe which can offer a wide range of possible applications in the field electricity, heating and cooling and has a great potential of development in many European countries. They would argue that it is the lack of knowledge of the advantages of using geothermal energy, and the spread of media reports of the disadvantages (e.g. high upfront costs, drilling risks, environmental threats such as induced seismicity, ground swelling, pollution of ecosystems by the surface inlet of deep geothermal brines, etc.).

What is clear is that the lack of public acceptance for geothermal energy installations hampers the further development of geothermal energy in many countries. A skeptical view on geothermal energy is rooted in, for example, a lack of information about the technology, old-fashioned approaches to conflict management from project owners in case of e.g. induced earthquakes. As a result, the public, funding agents, and politicians have concerns about possible risks in implementing geothermal projects, and social resistance often results in significant slowdown of projects. To ensure that geothermal energy can play its optimal role in Europe's future energy supply, it is essential to address important and influential stakeholder groups (political decision makers, potential investors and the public) to provide evidence based information which will address possible concerns which, when unbalanced, may impede an increased use of geothermal technologies.

This joint activity aimed to increase the social acceptance of all geothermal energy technologies in Europe. It intended to disseminate to a wider public the benefits, as well as the limitations of the various technologies by providing reliable and objective information. Furthermore, the joint activity

was expected to increase local awareness and encourage participation in the planning of geothermal projects, thus reducing their time to first revenue; to overcome the negative prejudice and to promote the use of geothermal energy through various approaches which have been proven successful in different countries.

5.7 Joint Activity «Geostat – Towards consistency»

Measuring and demonstrating success of support measures for geothermal energy relies in parts on reliable data on geothermal energy use. These data are collected by various national and international organizations. Owing to the differences in the way statistical surveys are carried out, seemingly identical data give rise to widely differing interpretations. Data are easily misunderstood, misinterpreted and give wrong signals. Therefore a common ground is needed to enable use and comparison of energy statistics, increase reliability, security and decrease fragmentation in line with the aim of these organizations, motions and regulations.

The Geothermal ERA-NET has therefore initiated a Joint Activity, GeoStat, to enable participating countries to reduce difference between industry and official statistics beyond a defined benchmark for the year 2020. GeoStat identified the source of error in each case with dissemination and discussions on terminology and definitions and direct comparison of statistics for each nation. Since the Geothermal ERANET partners are very close to, or identical with the organizations that manage such statistics, GeoStat also reduced duplication of efforts domestically. In addition GeoStat enabled the national collaboration to arrive at reliable statistics.

6 Key messages

The ultimate goal of the key messages is, of course, to provide in simple language phrases that demonstrate the value of concerted transnational research and innovation. The following 12 key messages on the strength and benefits of a coordinated geothermal research agenda are crucial for engaging all kind of stakeholders. The Geothermal ERA-NET has already developed some joint activities that exemplify the way key messages are being lived.

Table 7: Key messages through the Joint Activities

Key Message	ways of Workin	Concept	ReSus	Opera	GeoStat	EGIP	GEO
1.) Boost the European research and innovation value chain by developing a European innovation system for geothermal energy		x	x	x			
2.) Reduce the fragmentation in the European geothermal energy RDD&I arena	x	x	x			x	
3.) Eliminate gaps, avoid overlap and unnecessary duplication, and maximise synergies	x	x	x	x	x	x	
4.) Drive towards optimal allocation of national resources (funds, personnel and time) according to the strengths of national players and resource specifics while freeing up resources that are better deployed in other regions and organizations to deliver expected results	x					x	
5.) Help industry to identify best research partners	x	x	x	x		x	
6.) Give national program owners an opportunity to coordinate program implementation beyond national boundaries	x	x	x	x		x	
7.) Enhance existing strengths by competitively awarded Europe-wide RD&D projects	x	x	x	x			
8.) Facilitate Europe-wide roll-out of R&I results to the industry	x	x	x	x		x	x
9.) Remove research and innovation barriers to enhance the efficiency in the development of geothermal energy	x	x					x
10.) Strengthen the research infrastructure and areas of specification / utilisation	x	x	x	x		x	
11.) Contribute to the development of a European market for research, development and activities that is driven by excellence and value added rather than championing national entities that act exclusively on a local or national level	x	x	x	x			
12.) Position Europe in a worldwide context	x	x	x	x	x	x	x

7 Communication

7.1 Channels, tools and activities for communication

The following tools and activities are appropriate to communicating the key messages to the target audiences:

Media communication

- Geothermal ERA-NET Website
- European Geothermal Information Platform (EGIP) Website
- Newsletters and other information leaflets (e.g. 1-2 pager as information sheet)
- European Commission: Periodic activity and management reports
- Geothermal ERA-NET Reports

Active communication

- E-Mails / Telephone calls
- Meetings
- Workshops

7.2 Tasks

To communicate the key messages to individual target audiences the following channels, tools and activities will be useful.

Table 8: Communication tasks to distributing the key messages to the various target audiences.

Stakeholder (group)	Channels, tools, activities	Responsibility
Primary target audiences (very high importance / influence)		
Political Stakeholders of the EU; especially the EU Commission and the DG Energy	Media and active communication	PSB and CMG*
Partners of the Geothermal ERA-NET (National program owners / funding agencies)	Active communication	PSB and CMG*
Program owners / Funding agencies of Non-ERA-NET EU countries	Active communication	PSB and CMG*
National members of the SET-Plan Steering Group	Active communication	PSB and CMG*
European Geothermal Industry Associations (EGEC, GEOELEC-Platform, Steering Committee – Geothermal Technology Panel of the RHC-Platform)	Media and active communication	PSB and CMG*
EERA – Joint Program on Geothermal Energy	Media and active communication	PSB and CMG*
Secondary and tertiary target audiences (high, medium or low importance / influence)		
All other stakeholder groups	Media communication	PSB and CMG*

*PSB = Project Supervisory Board; CMG = Consortium Management Group

7.3 Timeline

The communication of the key messages via Media will be launched during the fourth quarter of 2015, while active communication will commence after acceptance of the communication plan 1 October, 2015

8 Impact

The communication of the key messages and proofs will engage principal stakeholders for the coordination of geothermal RDD&I in a European research agenda. Especially national program owners / funding agencies will be won over to participate in the planned Framework Partnership Agreement. The ground for the future formulation of a common European roadmap for geothermal energy technology RDD&I programme will, in that way, be prepared.

9 Conclusions

The main target audiences of the Communication plan are:

1. Political Stakeholders of the EU; especially the EU Commission and the DG Energy
2. Partners of the Geothermal ERA-NET (National program owners / funding agencies)
3. Program owners / Funding agencies of Non-ERA-NET EU countries
4. National members of the SET-Plan Steering Group
5. European Geothermal Industry Associations (EGEC, GEOELEC-Platform, Steering Committee – Geothermal Technology Panel of the RHC-Platform)
6. EERA – Joint Programme on Geothermal Energy

The strategy to reach the defined goals will be implemented by communicating the strengths and benefits of a coordinated European geothermal energy research agenda as key messages to the target audiences. Communicating the key messages and showcasing successful Joint Activities will engage principal stakeholders for the coordination of geothermal RDD&I in a European research agenda. Especially national program owners / funding agencies are targeted for a future participation in the planned Framework Partnership Agreement.

In a next step, the Geothermal ERA-NET will prepare a comprehensive action plan to successfully engage stakeholders in the run-up to the development of a strategic roadmap for geothermal energy RDD&I in Europe. The actions will ensure efficient and structured collaboration with principal stakeholders in order to further reduce the fragmentation of transnational research activities and policies and to maximize synergies. Existing technology platforms will be mobilized. Support and encourage large scale projects which would not be possible at national level. Output of the WPs 2 and 4 will be utilized to mobilize national and transnational program owners and funding agencies (public and private) for a coordinated geothermal RDD&I program. Subsequently, output of WP 7 will be used to engage with principal stakeholders to prepare the ground for the development of a strategic roadmap for geothermal energy technology RDD&I.

A publicly available inventory of existing support and funding schemes will facilitate rapid identification of strengths, weaknesses, threats and opportunities across European programs. Primarily through access via the Geothermal ERA-NET website, the inventory will enable the sharing of good practices and emulation within other national programs. Sharing RD&D ongoing efforts and a gap analysis will identify needs that will be communicated at national and European program meetings and aid in setting annual/cycle program goals. Through progressive enlargement of the ERA-NET to include other European countries, good practices are spread throughout Europe.

A particularly useful, «unifying» communication tool will be the preparation of a European geothermal energy action plan which centers on joint activities and joint programming. The action plan will help national and EC program owners and managers to identify key challenges and bottlenecks; define the actions to tackle them; estimate the RD&D investment levels needed; develop a model of prioritization to optimally deploy scarce resources (human resources and capital) and ultimately develop the optimal level of intervention. The action plan will be widely shared and distributed. The development of transnational joint activities will ensure that results from the analysis

of national RD&D programs will be used. Gaps will be eliminated and existing strengths will be enhanced by competitively awarded Europe-wide RD&D projects.

One particular focus is also to engage the European Commission and its administration in the light of the patchy support for geothermal energy which has been very limited in recent years (for example, an average of € 6 – 12 million has been spent per research Framework Program, which is only a small fraction of the cumulative national program budgets. Bringing geothermal energy resources to market, however, is a European issue and hence needs significantly more focus and attention by national program owners and managers and likewise the European Commission. The ultimate, long-term goal beyond this ERA-NET will transform itself into a framework in which EU Member States, as well as EU-associated and other European countries act in concert with the European Commission and take up the role of champion of concerted geothermal energy development in Europe – similar to, for example, the European Commission's uptake of Carbon Capture and Storage to manage European CO₂ issues.



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